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Effect of a Self-Help Mental Training Programme

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In this study, the effect of a mental training programme on several psychological variables and field hockey performance (penalty stroke) was evaluated. Twenty-nine female hockey players, playing at subnational level, were divided into an experimental, a placebo-control and a control group. Subjects in the experimental group received instruction on how to relax, concentrate and imagine making penalty-strokes. In addition, they received an audio tape containing these mental training instructions, and were asked to listen to it every day for about 10 minutes over a period of seven weeks.

The hockey performance of the experimental group was significantly better on the third test occasion than that of both control groups. Competitive state anxiety prior to performing penalty strokes did not differ between the three groups. However, at the end of the experiment, the experimental group reported feeling more confident, more relaxed and better concentrated when making penalty strokes than subjects in either placebo-control or control group. Subjects in the experimental group attributed their feelings to listening to the audio tapes.

KEY WORDS: Mental training, Anxiety, Self-Help.

The number of well-controlled intervention studies in sport psychology are relatively scarce. Recently, for example, Greenspan and Feltz (1989), published a review of research which addresses the efficacy of different psychological interventions with athletes performing in competitive situations in sport. Nineteen articles, covering 23 interventions, were included in the review. Of these 23 studies, six employed a single subject design. Of the remaining 17 studies, six were classified by the authors as having non control at all, three as having a «pre-post only» design, three as having a simple control group design and only five of the 17 studies were classified as having an (adequate) motivational control design.

Manipulation checks — assessment of the degree to which subjects were affected by each component of the intervention — were completely absent in half of the studies. Only four studies were classified by Greenspan and Feltz as having adequate or detailed manipulation checks.

The first goal of the present study was to examine the effect of a mental training programme on performance and some psychological variables, using a motivational control design and performing several manipulation checks.

Recently, a number of mental training programmes have become available for sport performers. Sport psychologists offer mental training packages by means of books, cassette tapes and video tapes (e.g., Bell, 1983; Nideffer, 1985; Orlick, 1986; Porter & Foster, 1986; Railo, 1986; Syer & Connolly, 1987). These materials are intended to help sport performers to learn mental skills and to improve performance. Palacio and Salmela (1986) called this approach the «self-help» model. The role of the sport psychologist is limited to provision of information.

On the basis of the number of books newly on the market in the field of mental training, it can be assumed that there is a certain amount of interest in this information. Some skills in the area of mental preparation can probably be adequately learned by means of the self-help model (for example goal setting). Moreover, the model implies the active involvement of the sport performer which is, in itself, a favourable side effect of this model. It seems, however, that little research to ascertain the success of such packages has been carried out.

The second goal of the present study was therefore to examine the effectiveness of a mental training programme in which the role of the sport psychologist was relatively small. Essentially, this role was limited to a verbal explanation, which was given twice, of why instructions on an audio tape would be helpful in improving performance. Immediately after this explanation, subjects listened once to the audio tape in the presence of the sport psychologist. After this, it was the subjects' own task to listen daily to the audio tape. The sport psychologist attempted with her explanation to motivate subjects to do so and to convince them of the usefulness of listening daily.

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Essential elemetns in the mental training programme on the audio tape were relaxation and concentration suggestions, followed by imagery instructions. Several studies into the effect of imagery combine imagery instructions with relaxation (e.g., Kendall, Hrycaiko, Martin, & Kendall, 1990; Lee, & Hewitt, 1987; Weinberg, Seaborne, & Jackson, 1981, 1987). The relaxation and concentration suggestions were intended to induce a weak form of self-hypnosis. According to Hilgard's neo-dissociation theory, this should offer the possibility to activate relevant subsystems and practice and improve a skill, without actually performing it (Hilgard, 1986). A positive effect on performance might be due to the better symbolic representation of a skill, as proposed by Feltz and Landers (1983).

The elements in the programme might also contribute to enhancement of feelings of self-efficacy (Bandura, 1977). As part of the mental training programme, subjects watched, on video, a model who perfectly performed penalty strokes. Modelling has been shown to increase perceived self-efficacy e.g., Gould, & Weiss, 1981, Weinberg, Gould & Jackson, 1979). According to Feltz (1984), imagining one's own performance might be thought of as a source of efficacy information similar to observing or imagining others engaging in a task.

Since people relatively high on competitive trait anxiety probably profit more from an intervention which enhances self-efficacy than subjects who already feel relaxed and self-confident in competitive situations, it was decided to select subjects with relatively high scores on Martens, Vealey, and Burton's (1990) Sport Competition Anxiety Test (SCAT).

The content of the training programme was specifically designed for the sport performers participating in the experiment (female hockey players). This was realised by, among other things, using a model who was similar in several characteristics to the subjects in the experiment. Model-observer similarity appears to be one of the important variables in modelling (Gould & Weiss, 1981).

It was predicted that hockey performance (penalty strokes) of subjects in the mental training group would improve from the first to the second and from the second to the third test occasion and that the mental training group would outperform the placebo and control groups. In addition, a decrease in cognitive and somatic anxiety and an increase in self-confidence for the mental trianing group was expected. Finally, it was predicted that heart rate would decrease while listening to the audio tapes and more so when listening to relaxation and concentration suggestions than to general information about field hockey.

Method

Subjects

Subjects were 30 female field hockey players, playing at sub-national level. These subjects were selected from a sample of 117 female field hockey players who had filled in a preliminary Dutch version of the Sport Competition Anxity Test (SCAT) (Martens et at., 1990). Of this sample of 117 subjects, 30 hockey players who had the highest competitive trait anxiety scores were divided into an experimental, a placebo-control and a control group. One subject in the experimental group dropped out of the experiment because of a sport injury. The assignment of subjects to one of the three groups was not completely random, but based on their place of residence, in an attempt to minimise travel costs. The age of the subjects was between 16 and 28 years (mean age 21.7 years). All subjects were volunteers.

General outline of the procedure

Fourteen hockey teams had been asked to fill in the SCAT and the preliminary Dutch version of the Competitive State Anxiety Inventory-II (CSAI-II) (Martens et al., 1990) about half an hour before a competition. Of the respondents, 30 subjects were selected as described above.

During a period of seven weeks, subjects met on three occasions, the second meeting on average three weeks after the first meeting, and the third meeting on average four weeks after the second. During each meeting, subjects received instruction, filled in one or more questionnaires and each subject performed 12 penalty strokes (on average in a group of six subjects).

On the first occasion, subjects listened to an explanation of the experiment in their own group. They then filled in the CSAI-II, walked to the hockey field and performed penalty strokes. For the control group, the meeting was then finished. Subjects in the placebo and experimental groups received information about the effect of listening to audio tapes on performance and listened to audio tapes for about 12 minutes. While listening to the audio tape, heart rate was measured continuously. For the placebo group, the tapes contained general information about field hockey. The experimental group received mental training instructions (see below). Subjects were instructed to listen to the audio tapes every day, which would take about 10 minutes daily. The meeting was held at an accommodation at the University, where none of the subjects had been before, and lasted about two hours for the placebo and experimental groups and one hour for the control group.

On the second occasion, the procedure described above was repeated. In addition to the information about listening to audio tapes, the placebo and experimental groups were shown a video tape. For subjects in the experimental group, this was part of a new visualising/imagery instruction.

On the third occasion, all subjects again filled in the CSAI-II and performed 12 penalty strokes. Subjects in the placebo and experimental groups listened to the audio tapes one last time, whereby subjects in the placebo group listened to the tape of the experimental group and vice versa. Subjects finished this meeting by filling in a questionnaire, asking several questions about their experiences with the experiment.

INTERVENTION PROGRAMMES

1. Mental training programme *

The audio tape which was listened to for the first three weeks of the experiment started with the instruction to sit in a comfortable chair or to lie down comfortably. Subjects were asked to concentrate on a point in the middle of their forehead, to close their eyes and to relax. Suggestions of complete relaxation and concentration were repeatedly given, while the instructor counted slowly from 1 to 20. After about five minutes, a switch was made from relaxation and concentration suggestions to imagery instructions. Subjects were asked to imagine themselves and the surroundings (seeing, hearing, feeling, smelling) while preparing for a penalty stroke and performing this in a real life hockey situation. Next, subjects were to imagine themselves performing two penalty strokes in the left and two in the right corner, just as they had to do in the experiment.

The audio tape which was listened to in the second half of the experiment (fourth and fifth weeks) started with the same relaxation and concentration suggestions. After the general imagery instruction, subjects' attention was drawn to the image of a perfect model (Monique) whom they had seen on a videotape. They were instructed to concentrate on Monique and on the perfect penalty stroke she was performing. Subjects were then asked «to transfer Monique to themselves». «It is not Monique who is performing perfectly, it is yourself who is performing this perfect push». Next, subjects performed two left corner and two right corner penalty strokes.

In the sixth and seventh weeks of the experiment, subjects were free to choose either the first or the second audio tape to listen to.

2. The placebo control programme

The audio tape which were listened to by the placebo control group contained general information about field hockey (including information about the history of hockey, injury in hockey, technical aspects and tactics). At the first meeting, subjects were informed about the rational of listening to these tapes: «We suppose that by daily listening, for about 10 minutes, to information about hockey, people will be, unconciously, more engaged with hockey. According to psychological theories this will — in the long run — lead to improved performance and our experiment is designed to prove this hypothesis».

On the second occasion, the rationale was repeated. In addition, subjects watched a videotape showing part of a competition between the Ducth and Australian national women's field hockey teams.

Performing penalty strokes

Penalty strokes were performed on an ordinary hockey field (natural grass) Two circles, 30 cm. in diameter, were fixed in the left and right corners of the goal, 15 cm. above the ground. Subjects stood 6 m. in front of the goal, near the penalty spot. A referee announced the corner into which subjects should push the ball. Subjects had exactly 5 seconds to prepare for their push. The referee subsequently followed the normal procedure in field hockey when a penalty stroke is performed. All subjects used their own sticks.

On the first occasion, subjects had the opportunity to make 12 practice strokes, while on the second and third occasions, six such practice strokes were performed. Immediately after the last practice stroke, subjects, one after another, performed a penalty stroke. Every subject performed 12 penalty strokes, six in the left and six in the right corner.

All penalty strokes, including those made during practice, were videotaped. Subjects' attention was repeatedly drawn to this fact in an attempt to create some stress in the situation. In addition, a competition between all 30 participants had been organised. The results of the three occasions were to be published in a regional hockey journal (which they have been). Simulating the ordinary procedure used in competition when performing penalty strokes was a further attempt to create a stressful situation.

Afterwards, all penalty strokes were scored from the video. A score was assigned, depending on where the ball hit the goal plane:

- through the circle 5 points
- hitting the circle or the goal post 3 points
- within a distance of 50 cm. from the circle 2 points
- within a distance of 1.5 m. from the circle 1 points

Scoring turned out to be highly reliable (inter and intra observer correlations being above $r = .95$).

Apparatus

For videotaping and scoring penalty strokes, a colour video camera (Panasonic WVP-200E), a Philips VR 2350 video recorder and monitor were used. Audio tapes used were TDK and BASF. Heart rate was measured with a sport tester TMPE 3000 (Polar Electro).

Questionnaires

Dutch versions of the Sport Competition Anxiety Test (SCAT) and Competitive State Anxiety Inventory-II (CSAI-II) (Martens et al., 1990) were developed. In a sample of 28 female hockey players, not involved in any way in the experiment, the Dutch version of the SCAT had been filled in twice, with an interval between first and second testing of four months. The test-retest correlation in this sample was $r = .75$ ($N = 28$). The internal consistency (Cronbach's alpha) was $\alpha = .86$. In the sample of 117 hockey players, from which the participants in the experiment were selected, Cronbach's alpha was $\alpha = .80$ ($N = 117$). Item-rest correlations varied in both samples between $r = .21$ and $r = .75$.

The CSAI-II contains three subscales: CSAI-«cognitive», intended to measure cognitive anxiety: CSAI-«somatic», for measuring somatic anxiety; and CSAI-«self-confidence», intended to measure feelings of self-confidence. The internal consistency of these subscales (Cronbach's alpha), computed for the sampe of 117 hockey players, were $\alpha = .73$, $\alpha = .89$ and $\alpha = .86$ respectively for cognitive, somatic and self-confidence subscales.

Reliability results for both SCAT and CSAI-II can be considered fair. The results do not deviate very much from data reported by Martens et al. (1990), with an exception for the alpha of the cognitive anxiety subscale of the CSAI-II, which is relatively low in this experiment.

* The detailed content of the mental training programme is available on request from the first author. The authors would like to acknowledge dr. Ferdi Oyen for his invaluable support in designing and developing the programme.

Scores on the CSAI-II of the sample of 117 hockey players were factor analysed (varimax rotation, after Kaiser normalisation). A rotation with two and three factors was performed. In the two factor solution (Eigen values of the first and second factor being 7.55 and 3.49 respectively), a somatic anxiety factor could be clearly identified. All — a-priori — defined somatic anxiety items loaded high on this factor. The three factor solution (Eigen values 7.59, 3.53 and 1.23 respectively), however, did not show the presumed three factors convincingly».

Evidently, the Dutch version of the CSAI-II contains a subscale «somatic anxiety», which measures a construct, distinguishable from both other a-priori subscales. These subscales — «cognitive anxiety» and «self-confidence» — however, can be less clearly identified as separate constructs than in the original CSAI-II (Martens et al., 1990). Since the internal consistency of these two subscales is nevertheless fair, they will be handled separately and labelled according to their a-priori definitions.

Correlations between SCAT and the three subscales of the CSAI-II were calculated for the sample of 117 hockey players and amounted to r = .14, r = .52 and r = .33 for cognitive anxiety, somatic anxiety and self-confidence, respectively. These results give some modest support for the validity of both questionnaires.

A questionnaire was developed specifically for this experiment and contained questions to elicit information about, among other things, frequency of listening to tapes, feelings while listening to the tapes, feelings when performing penalty strokes and whether changes in performances could be attributed to listening to the audio tapes.

Debriefing

At the end of the last session, all subjects were informed about the procedure in the other groups, and about the precise aim of the experiment.

Statistical analysis

Hockey scores and CSAI-scores were analysed by ANOVA's for repeated measurement. For post hoc analyses, Newman Keuls tests were performed.

Results

Effects of the intervention programmes on CSAI-II scores

Competitive state anxiety was assessed by means of the CSAI-II at the beginning of the first, second and third occasions. For each subscale, an analysis of variance was performed with the factors group (experimental, placebo and control) and moment (first, second, third occasion) with repeated measures on this factor.

* More detailed information about these results is presented in the manual of the Dutch/Flemish version of the SCAT and CSAI (Bakker, Vanden Auweele, & Van Mele, in press).

For somatic anxiety, significant effects were found for the factor group ($F_{(2,36)} = 5.62$; $p < .01$) and the factor moment ($F_{(2,52)} = 16.84$; $p < .001$). The interaction effect was not significant ($F_{(2,52)} = .25$; ns). The group effect demonstrated a significantly higher somatic anxiety score for subjects in the placebo group as compared with the control and experimental groups, which did not differ from each other. The other main effect indicates significantly lower somatic anxiety scores on the third test occasion, relative to the first test occasion (see Figure 1).

For cognitive anxiety, the main effect for the factor group was not significant ($F_{(2,26)} = .71$; ns). For the factor moment, the main effect was significant ($F_{(2,52)} = 10.55$; $p < .001$). In addition, a significant interaction effect was found ($F_{(2,52)} = 4.23$); $p < .01$), indicating a significantly higher score for the placebo group than for both other groups on the first test occasion and a significant decrease for the placebo group from first to second test occasion (see Figure 2).

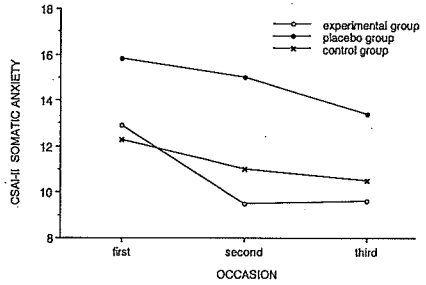

Fig. 1. - CSAI-II somatic anxiety scores for experimental, placebo and control groups on first, second and third test occasion.

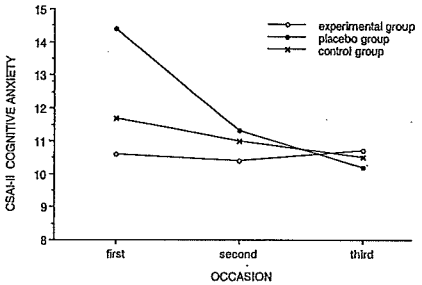

Fig. 2. - CSAI-II cognitive anxiety scores for experimental, placebo and control groups on first, second and third test occasion.

For self-confidence, no significant main effect for the factor group showed up ($F_{(2,26)} = 1.47$; ns). The main effect for the factor moment was significant ($F_{(2,52)} = 10.78$; $p < .001$), as was the interaction effect ($F_{(2,52)} = 3.07$; $p < .05$). Post hoc analysis revealed a significant difference between groups on the first occasion. Subjects in the control group attained higher self-confidence scores ($p < .01$) than subjects in the placebo group, whose scores were higher than for subjects in the experimental group ($p < .01$). On the second and third test occasions, self-confidence scores for

subjects in the experimental group were still significantly lower than for subjects in both other groups ($p < .01$).

For the experimental group, self-confidence scores increased from the first to the second test occasion ($p < .01$) and from the second to the third occasion ($p < .05$). For the placebo group, self-confidence scores increased significantly from the first to the third test occasion ($p < .01$) (see Figure 3).

Summarising these results, it can be concluded that somatic anxiety decreased continuously for all three groups from the first to the third test occasion. Cognitive anxiety decreased for the placebo group only, from the first to the second test occasion. This group, however, obtained significantly higher cognitive anxiety scores on the first test occasion than both other groups. Self-confidence scores increased continuously for placebo and experimental groups from the first to the third test occasion. These groups initially obtained, on the first test occasion, significantly lower scores than the control group.

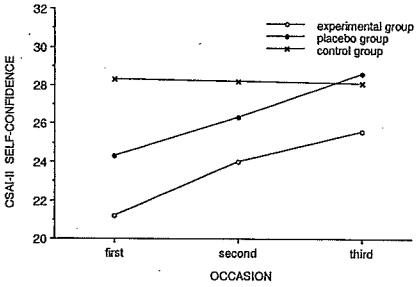

Fig. 3. - CSAI-II self-confidence scores for experimental, placebo and control groups on first, second and third test occasion.

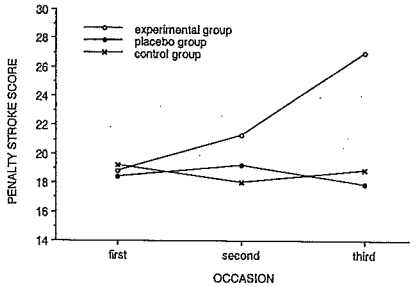

Fig. 4. - Penalty stroke scores for experimental, placebo and control groups on first, second and third test occasion.

Hockey performance

An analysis of variance on the penalty stroke scores, with the factors group and moment and repeated measures on this last factor, revealed no significant effect for the factor moment ($F_{(2,52)} = 2.85$; ns.). The main effect for the factor group tended to be significant ($F_{(2,26)} = 3.26$; $p < .06$), while the interaction effect was significant ($F_{(2.52)} = 4.44$; $p < .01$). Post hoc analysis indicated significantly higher hockey scores for the experimental group as compared with placebo ($p < .01$) and control groups ($p < .05$) on the third test occasion. In addition, scores for the experimental group were

significantly better on the third test occasion than on the second ($p < .05$) and first occasion ($p < 0.1$) (see Figure 4).

The experimental group was clearly the only group which demonstrated improved performance in the course of the experiment. Before attributing this improvement to the mental training intervention, it is interesting to learn how subjects themselves attributed their improvement and, more generally, looked back upon the interventions.

Subjects' retrospective view of the interventions

At the end of the third meeting, subjects answered several questions relevant to the experiment and the intervention programmes.

To the question of whether a possible performance improvement should be attributed to listening to the audio tapes, seven subjects in the experimental group answered that this was surely so (2) or possibly so (5). Two subjects said that an improvement could definitely not be attributed to the audio tapes. In the placebo group, two subjects answered that an improvement in their performance could possibly be a result of listening to the tapes. Four subjects said there was definitely no relationship and four other subjects answered that they did not know ($\chi^2 = 7.88$; $df = 3$; $p < .05$).

Subjects were also asked to indicate whether they felt more, equally or less somatically relaxed, mentally relaxed, self-confident and concentrated the third time they performed penalty strokes, compared with the first time. The answers of the three groups are presented in Table I A χ test was performed on the sum scores of the four questions and revealed a highly significant difference between groups ($\chi^2 = 22.47$; $df = 4$; $p < .005$).

Table I

Answers of subjects to the question of whether they felt more, equally or less relaxed, self-confident and concentrated when performing penalty strokes on the third test occasion relative to the first occasion.

	Experimental			Placebo			Control		
	More	Equally	Less	More	Equally	Less	More	Equally	Less
Somatically relaxed	8	—	1	5	2	3	4	5	1
Mentally relaxed	8	1	—	5	3	2	4	6	—
Self-confident	5	4	—	1	9	—	4	4	2
Concentrated	6	3	—	2	7	1	2	6	2
Total	27	8	1	13	21	6	14	21	5

In addition, subjects in the experimental and placebo groups were asked, whether, when something had changed, these changes could be attributed to listening to the audio tapes. The answers are presented in Table II. As is evident from this Table, the majority of subjects in the experimental group tended to attribute changes in their feelings to listening to the audio tape. Eleven answers indicated a definite relationship, 15 times subjects considered such a relationship to be probable, and only three answers indicated no relationship. In contrast, in the placebo group, 16 answers indicated that there was definitely no relationship between listening to the audio tapes and changes in feelings of relaxation, self-confidence or concentration, and only one subject considered this relationship to be definitely present.

TABLE II

Number of subjects who attributed changes in their feelings to listening to the audio tapes.

	Changes are the result of listening to the audio tapes									
	Definitely		Probably		Definitely not		do not know		not relevant	
	Exp	Plac	Exp	Plac	Exp	Plac	Exp	Plac	Exp	Plac
Somatically relaxed	3	1	4	1	—	5	1	2	1	1
Mentaly relaxed	2	—	4	2	1	5	1	2	1	1
Self-confident	—	—	5	1	2	5	1	1	1	3
Concentrated	6	—	1	1	—	1	2	5	—	3
Total	11	1	14	5	3	16	5	10	3	8

The same type of questions were asked with respect to feelings during competition and whether possible changes herein could be attributed to listening to the audio tapes. For these questions, only minor differences, which were not significant, showed up.

MANIPULTATION CHECKS

Subjects were also asked to indicate whether they had been listening to the audio tape every day, as instructed. Subjects in both experimental and placebo groups answered that they had been listening to the audio tapes at least four or five times per week. Interestingly, subjects in the experimental group had more often experienced listening as annoying than subjects in the placebo group. This might have been caused by the different content of every audio tape for subjects in the placebo group, while subjects in the experimental group had to listen to the same mental training instruction every day. These data indicate that subjects in the placebo group were at least as motivated to listen to the tapes as were subjects in the experimental group.

Six subjects in the experimental group indicated that they were, in general, more relaxed after listening to the audio tape than before. Three subjects said that no difference existed. In the placebo group, these figures were 3 and 7, respectively.

Finally, six out of the nine subjects in the experimental group confirmed that Monique, the ideal model, had contributed significantly in visualising penalty strokes.

Due to failure of the apparatus for measuring heart rate, complete heart rate data for all three occasions were available for only seven subjects (four in the experimental and three in the placebo group). Differences in heart rate were calculated between mean heart rate during the last five minutes before subjects started listening to the audio tapes («rest» value or «baseline») and while listening to the relaxation and concentration suggestions in the mental training programme (A1) and the imagery instruction (A2) or to the general information about hockey (B). The results for the seven subjects for whom complete heart rate data are available are presented in Table III. The results for all subjects for whom heart rate data are available are presented in Table IV.

Evidently, when listening to the audio tapes, heart rate decreased. This was so when subjects were listening to the mental training programme and to general hockey information. Data also seemed to indicate a greater decrease of heart rate when listening to the mental training instructions,

TABLE III

Changes in heart rate when listening to the audio tapes (R = mean heart rate during last 5 minutes before listening to the audio tapes; A1 = mean heart rate while listening to relaxation suggestions; A2 = mean heart rate while listening to imagery instruction; B = mean heart rate while listening to general hockey information. Seven subjects with complete heart rate registrations.

	First occasion		Second occasion		Third occasion	
	ΔR-A1	ΔR-A2	ΔR-A1	ΔR-A2	ΔR-B	
Experimental (n = 4)	−8.56	−8.18	−4.37	−5.08	−3.49	
	ΔR-B		ΔR-B		ΔR-A1	ΔR-A2
Placebo (n = 3)	−4.56		−6.46		−11.27	−15.15

TABLE IV

Changes in heart rate when listening to the audio tapes for all subjects for whom heart rate data are available.

	First occasion		Second occasion		Third occasion	
	ΔR-A1	ΔR-A2	ΔR-A1	ΔR-A2	ΔR-B	
Experimental	−5.65 (n = 8)	−5.75	−4.76 (n = 8)	−5.35	−3.65 (n = 7)	
	ΔR-B		ΔR-B		ΔR-A1	ΔR-A2
Placebo	−6.72 (n = 8)		−3.80 (n = 8)		−13.17 (n = 4)	−15.89

as compared with listening to information about hockey. The number of subjects for whom complete heart rate data were available is, however, too small to make statistical testing relevant here.

DISCUSSION

We will begin this Discussion with a brief summary of the main results of the study.

1. Hockey performance for subjects in the experimental group improved significantly from the first to the third test occasion, on which occasion their performance was significantly better than that for subjects in the placebo and control groups.

2. Subjects in the experimental group reported, in retrospect, feeling more relaxed, self-confident and concentrated when performing penalty strokes than did subjects in both other groups. However, these results were not confirmed by the CSAI-scores. Differences between groups for somatic anxiety, cognitive anxiety and self-confidence appeared not to be related to the different treatments (mental training, placebo, or no treatment at all).

3. Manipulation checks revealed that subjects had been listening regularly to the audio tapes (at least four to five times per week). It also appeared that the majority of subjects in the experimental group felt more relaxed after listening to the audio tape than before. The majority of this group reported that the ideal model «Monique» had been helpful in visualising. Finally, heart rate decreased when subjects listened to audio tapes and,

it appeared, more so when listening to the mental training programme than to the general information about hockey.

4. Subjects in the experimental group more often attributed a performance improvement to listening to the audio tapes than did subjects in the placebo group.

In short, the majority of the subjects believed in the effectiveness of the programme. The improved hockey performance of the experimental group on the third test occasion might be explained by this conviction. The subjects believed that, by doing the mental training, their performance would improve. Several studies confirm the positive effect on performance on the conviction of being in an advantageous situation (e.g., Deboeck, Hueting, Michels & Soetens, 1983; Hueting, 1988; Weinberg, Gould & Jackson, 1979; Weinberg, Yukelson & Jackson, 1980). Listening to the relaxation and concentration suggestion, combined with the mental rehearsal of the penalty stroke, would then have increased subjects' feelings of self-efficacy (Bandura, 1977). Self-efficacy is not a concept of general self-confidence, but is defined as «specific self-confidence». Feltz (1984), in her discussion of Bandura's theory, clarifies the concept with the example of someone who has a high degree of self-confidence in his or her ability to make lay-up shots in basketball, but not in making shots from the outside. This might be an explanation for the seemingly contradictory results between retrospective data and CSAI-scores. The retrospective data concern the feelings experienced by the subjects when performing penalty strokes. The CSAI-items are asking for more general feelings of self-confidence in competitive situations. The increasing feelings of self-confidence in the experimental and placebo groups, as exemplified by the CSAI-scores, as well as the decrease of somatic anxiety for all three groups in the course of the experiment, may be primarily a result of increasing familiarity with the experimental situation. It is worth mentioning that subjects in the experimental group did not report more changes in relaxation, self-confidence and concentration during competition relative to both other groups, a finding which lends support to the contention that the mental training programme had rather specific effects.

This explanation, however, does not offer an adequate answer to the question of why subjects in the experimental group improved their hockey performance only on the third occasion. On the second test occasion, there was no significant performance gain relative to the first test occasion. The lenght of the intervention might be a factor in explaining this. Subjects had been listening to the audio tapes, on average, 12 to 15 times for 10 to 12 minutes each time. Compared to interventions in most other studies,

this is relatively short. Frenker and Lambiotte (1987), for example, had approximately 50 sessions of 10 minutes each. Also, interventions used in studies by, e.g., Hamilton and Fremouw (1985), Kendall et al. (1990) and Straub (1989) lasted considerably longer than the 2.5 hours which subjects in the present study spent on mental training during the first three weeks of the experiment.

An alternative explanation, however, might be that the introduction of the model, performing a perfect penalty stroke, on the second session played an important role. Subjects watched this model several times on video tape and were instructed to use the model when they were imagining penalty strokes at home, while listening to the cassette tape. This explanation is supported by the results of a study by Hall an Erffmeyer (1983). These authors found that experienced female basketball players improved their free throw performance significantly when the visuo-motor behaviour rehearsal was combined with watching a videotaped model. Subjects who received only relaxation and imagery training did not improve. It should be noted that this explanation fits with the symbolic learning theory as well as with the self-efficacy theory of Bandura. Specifically, according to Bandura's theory, it is important to see someone else (or oneself) successfully execute the task. This was strongly stimulated by watching the model and then being instructed to transfer the model to oneself.

It may be concluded that a mental training programme in which the role of the sport psychologist was relatively small could produce some of the predicted effects, most likely by enhancing feelings of self-efficacy in the subjects. It should be noted, however, that the effects were rather specific. In the specific situation in which penalty strokes had to be performed, subjects in the mental training group felt more self-confident, relaxed and concentrated than subjects in both other groups. For the normal competition situation, no such differences were apparent between groups. Also, more general measures of competitive state anxiety and self-confidence were not affected differently for subjects in the mental training group, compared with both other groups. Finally, it should be mentioned that the mental training programme which was developed was designed rather specifically for the test occasion. Programmes which can be purchased by sport performers will be, by definition, of a more general kind. The conclusion that those self-help mental training packages will be effective seems therefore premature and not justified by the results in this study.

Personal note of the first author. I dedicate this article to the memory of my co-author Colette Kayser, who recently died at an age at which she had a life before her.

RÉSUMÉ

Cette étude a porté sur l'effet d'un programme d'entraînement mental sur plusieurs variables psychologiques et la performance en hockey sur gazon (tir de pénalty). Vingt neuf joueuses de niveau régional ont été réparties dans un groupe expérimental, un groupe contrôle placebo et un groupe contrôle. Les sujets du groupe expérimental on reçu des consignes sur la manière de se relaxer, de se concentrer et de s'imaginer en train de tirer le pénalty. On leur remettait également une cassette «audio» contenant ces consignes d'entraînement mental et il leur était demandé de l'écouter environ 10 minutes chaque jour pendant une période de 7 semaines. La performance en hockey (tir de pénalty) et l'état d'anxiété compétitive ont été mesurés à trois occasions, les deux premières étant le jour où les consignes étaient données. Au troisième test, les performances en hockey des joueuses du groupe expérimental étaient significativement meilleures que celles des joueuses des deux groupes contrôles. L'état d'anxiété compétitive avant de tirer le pénalty ne différait pas significativement dans les trois groupes. Néanmoins, à la fin de l'expérience, les joueuses du groupe expérimental se sentaient plus confiantes, plus relaxées et davantage concentrées que les sujets des groupes contrôles. Les sujets du groupe expérimental ont attribué cette sensation à l'écoute de la cassette audio.

RESUMEN

Esta investigación ha evidenciado el efecto que tiene un programa de entranamiento mental por lo que se refiere a unas variables psicológicas y a prestaciones en el hockey sobre hierba (penalty). Veinti-nueve jugadoras de hockey, no de nivel nacional, fueron dividas en un equipo experimental, uno de «placebo-control» y uno de control. Los subjetos del equipo experimental recibieron instructiones sobre cansancio, concentración y imaginación mientras chutan un «penalty».

Además, recibieron una cajita-audio con las instrucciones para efectuar el entrenamiento mental y se les pidió escucharla cada día por 10 minudos por la duración de siete semanas. La prestación en el hockey (penalty) y la ansiedad de condición competitiva fueron misuradas en tres ocasiones, donde las primeras dos han sido efectuadas en el mismo día mientras del equipo experimental, en relación a los otros dos equipos, resultó de manera significativa mejor durante la tercera situación de valoración.

Entre los grupos no se evidenciaron diferencias relacionadas a la ansiedad de condición competitiva, percebida en los momientos que anteceden el «penalty». Sin embargo, al termino del experimento el equipo experimental ha puesto en evidencia sentimientos de mayor confianza, de mayor cansancio, y de mejor concentración para chutar el «penalty», respeto a los otros dos equipos.

Los subjetos del equipo experimental atribuyeron sus sentimientos a la cajita-audio escuchada.

ZUSAMMEMFASSUNG

In dieser Untersuchung wurde der Effekt eines mentalen Trainingsprogramms auf verschiedene psychologische Variablen sowie auf die Leistung im Feldhockey (Strafstoß) überprüft. 29 Hockeyspielerinnen der 2. Spielklasse wurden in eine Experimentalgruppe, eine

Placebo-Kontrollgruppe und in eine Kontrollgruppe eingeteilt. Die Versuchspersonen in der Experimentalgruppe erhielten Anweisungen zum Entspannen, zum Konzentrieren und zur Vorstellung eines ausgeführten Strafstosses. Anschließend erhielten sie ein Tonband, welches diese mentalen Trainingsinstruktionen enthielt, und wurden aufgefordert, dieses Band über einen Zeitraum von sieben Wochen täglich zehn Minuten lang anzuhören.

Die Hockeyleistung (Strafstösse) und die wettkampfbezogene Zustandsangst wurden zu drei Gelegenheiten gemessen. Die ersten beiden Meßzeitpunkte waren an dem Tag, an dem die Anweisungen gegeben wurden.

Die Hockeyleistung der Experimentalgruppe war beim dritten Test signifikant besser als die der beiden Kontrollgruppen. Die wettkampfbezogene Zustandsangst vor der Ausführung der Strafstösse unterschied sich nicht zwischen den drei Gruppen. Am Ende des Experiments schätzte sich jedoch die Experimentalgruppe selbstsicherer, entspannter und besser konzentriert ein beim Ausführen der Strafstösse als die Versuchspersonen sowohl in der Placebo-Kontroll wie auch der Kontrollgruppe. Die Versuchspersonen in der Experimentalgruppe schrieben diese Gefühle dem Anhören der Tonbandkassetten zu.

RIASSUNTO

Questo studio ha valutato l'effetto che ha un programma di allenamento mentale su alcune variabili psicologiche e sulla prestazione dell'hockey su prato (rigore). Ventinove giocatrici di hockey, non di livello nazionale, sono state suddivise in un gruppo sperimentale, uno di placebo-controllo e uno di controllo. I soggetti del gruppo sperimentale hanno ricevuto istruzioni su come rilassarsi, concentrarsi e immaginarsi mentre tirano un rigore. Inoltre, hanno ricevuto una cassetta-audio contenente le istruzioni per effettuare l'allenamento mentale ed è stato loro chiesto di ascoltarla ogni giorno per 10 minuti per un periodo di sette settimane. La prestazione nell'hockey (rigore) e l'ansia di stato competitiva sono state misurate in tre occasioni, di cui le prime due sono state effettuate nello stesso giorno durante il quale le istruzioni sono state fornite. La prestazione nell'hockey del gruppo sperimentale, rispetto agli altri due gruppi, è risultata significativamente migliore durante la terza situazione di valutazione. Fra i gruppi non sono emerse differenze in relazione all'ansia di stato competitiva avvertita nei momenti che precedono il rigore. In ogni caso, al termine dell'esperimento il gruppo sperimentale ha riportato sentimenti di maggior fiducia, di maggior rilassamento, e di miglior concentrazione nell'azione del tirare il rigore rispetto agli altri due gruppi. I soggetti del gruppo sperimentale hanno attribuito i loro sentimenti all'ascolto della cassetta audio.

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